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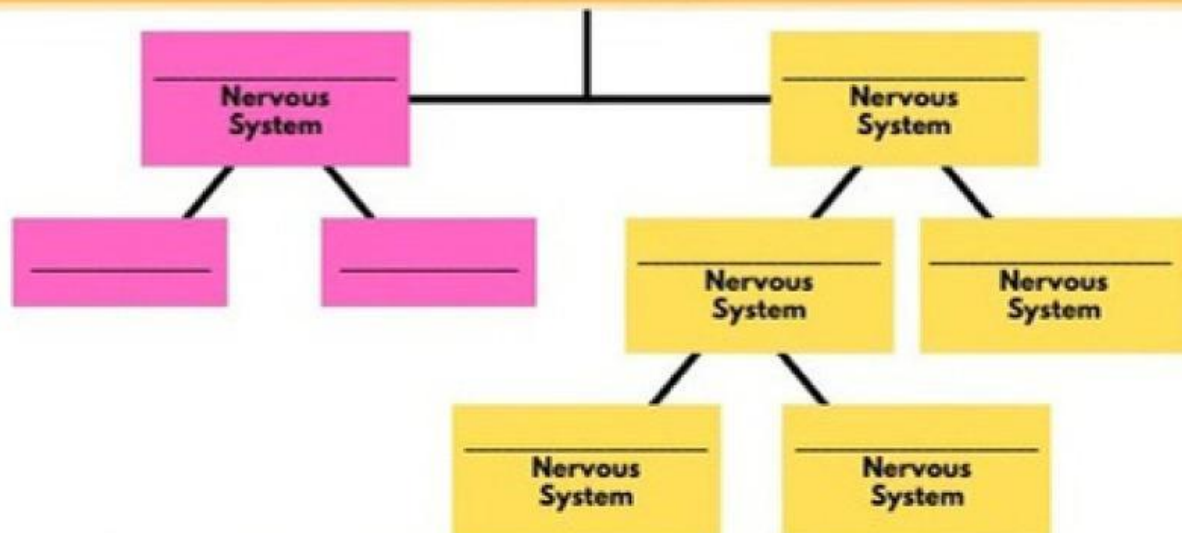
Nervous System, Endocrine System, & Fight or Flight Response

A-level Psychology | AQA | Paper 2 | Biopsychology



The human nervous system is a complex network of nerve cells that carry messages to and from the brain and spinal cord to different parts of the body and so helps all the parts of the body to communicate with each other. In other words, the nervous system is a specialised network of cells in the human body and is our primary internal communication system.

Nervous System (Divisions of the Nervous System)



Nervous System	Role
Central Nervous System	CNS consists of the brain and spinal cord. The spinal cord sends information to the brain from the outer parts of the body (PNS), and sends signals from the brain to the PNS.
Peripheral Nervous System	
Somatic Nervous System	
Autonomic Nervous System	
Sympathetic NS	Activates fight or flight response.
Parasympathetic NS	The bodies resting state. Its actions are antagonistic to the sympathetic NS.

Endocrine System

Instead of using nerves to transmit information like the nervous system, the endocrine system instructs glands to release hormones directly into the bloodstream. These hormones affect any cell in the body that has a receptor for that hormone. It acts much more slowly than the nervous system but has very widespread and powerful effects.

Gland = an organ in the human body which secretes particular chemical substances (hormones).

Hormones = a chemical substance produced by glands that can have powerful effects on specific organs in the body.

So the function of the endocrine system is:

Label Eddie

- a) Identify the 5 Glands in Eddie the Endocrines body
- b) What hormone do they release?
- c) What effect do they have on the body?



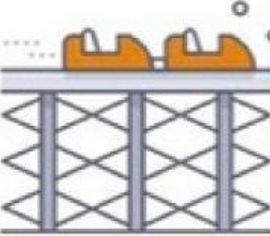
Fight or Flight Response (the role of Adrenaline)

Finally, let's explore how the nervous system & endocrine system work together in the fight or flight response.

Fight or Flight response = the way a human responds when stressed (when a stressor is perceived); to changes to the body to enable a person to either fight or run away.

Adrenaline = a hormone released by the adrenal medulla as part of the immediate stress response which effects various parts of the body including heart rate, digestion and pupil dilation.

When we perceive a stressor (in the queue for a rollercoaster) a part of the brain triggers activity in the PNS, specifically in the autonomic nervous system, specifically the sympathetic nervous system. The ANS changes from its normal resting state (the parasympathetic state) to the physiologically aroused, sympathetic state. This activates the fight or flight response.

Stressor (e.g. in queue for rollercoaster) 	Autonomic Nervous System	
	Sympathetic Nervous System	
	Endocrine System Adrenal Gland	
Rollercoaster ride has ended		
	Parasympathetic Nervous system	

Sympathetic Nervous System (Fight or Flight Response)	Parasympathetic Nervous System (Rest and Digest)
	
	
	
	
	
	



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Structure & Function of Neurons

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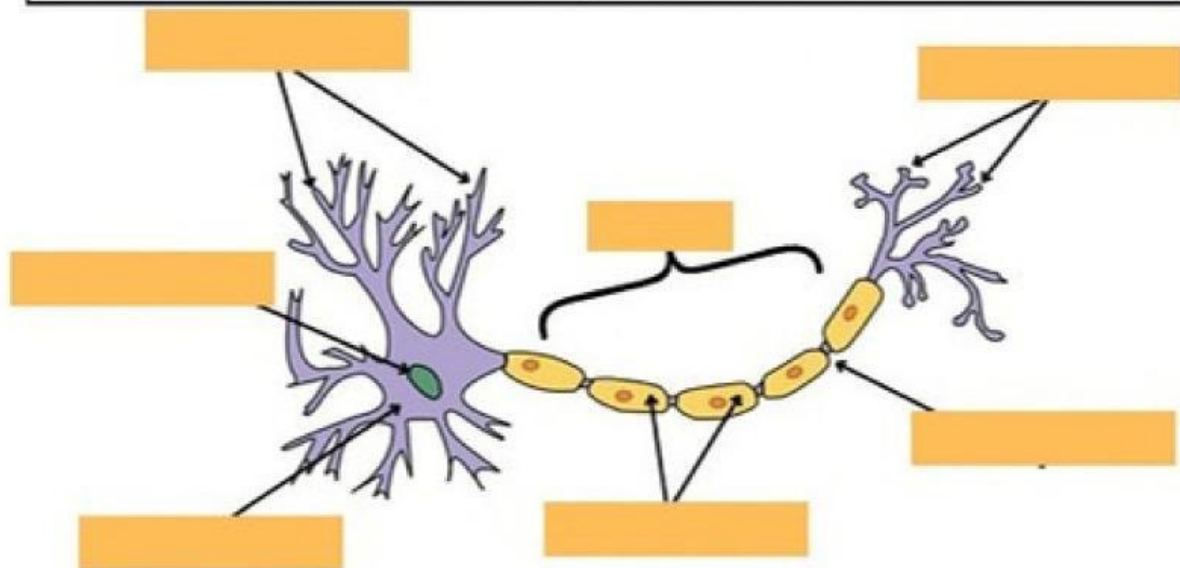
In this section we are going to ask how the nervous system transmits signals round the body; how it communicates with itself. This is where neurons come in. Firstly, we are going to explore the Structure and Function of Neurons, including Sensory neurons, Relay neurons and Motor neurons. Then secondly, we are going to explore Synaptic Transmission.

Neurons

(Structure & Function)

Your nervous system is thought to contain somewhere around 100 billion neurons, with your brain containing approximately 80% of them! Neurons enable communication within the nervous system and these neurons transmit signals electrically and chemically.

WITHIN a neuron, signals are transmitted _____, where the electrical signal starts at the dendrites and travels along an axon to the terminal buttons.



Cell Body

Dendrites

Axon

Myelin
Sheath

Nodes of
Ranvier

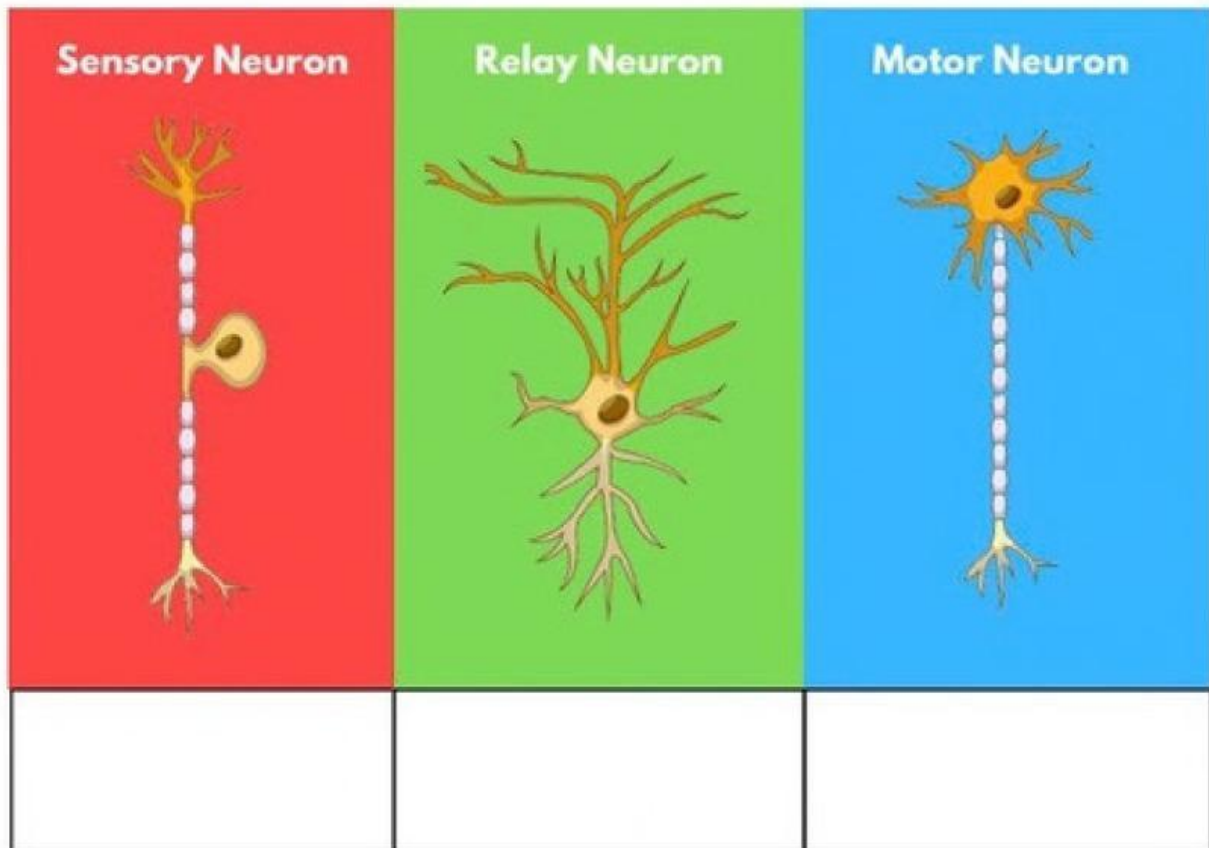
Terminal
Buttons

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Types of Neurons (Structure & Function)



Now let's learn about the different type of neurons. And to help us understand that we need to talk about receptors and effectors in the nervous system.

Receptors are cells in the body that detect a change in the environment (from a stimulus) and produce electrical impulses in response.

For example, our sense organs contain receptors that respond to a specific stimulus, such as our skin detecting temperature, or our tongue detecting chemicals in the food we eat. When this change in the environment is detected, effectors produce a response.

Effectors are an organ or cell that acts in response to a stimulus. Effectors are often muscles and glands. So, effectors might be a muscle contracting to move an arm. Or it might be a gland like the adrenal gland releasing a hormone like adrenaline into the blood.



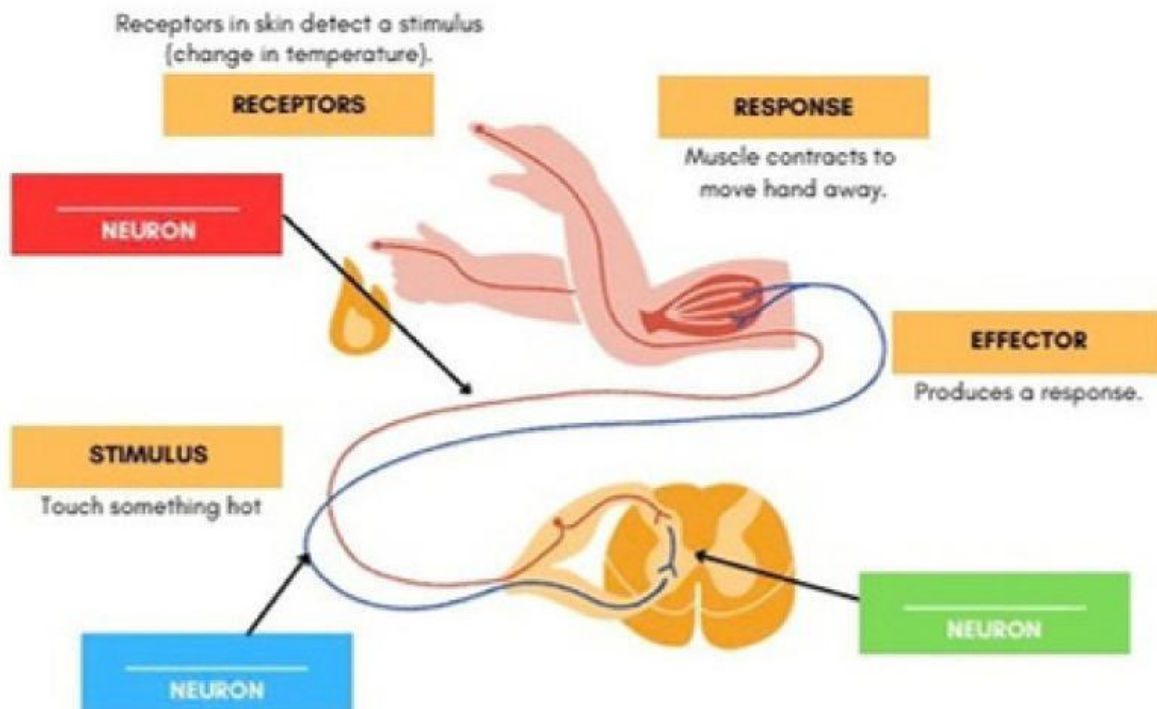
STIMULUS	You touch something hot
RECEPTORS	Receptors in the skin detect a stimulus (the change in temperature).
EFFECTOR	The Effector produces a response
RESPONSE	The response is the muscle contracts to move hand away.

Reflex Action

But how does the information from receptors who detect information from stimuli, go to the effectors to bring about a response? This brings us to the reflex action. A reflex action is an automatic, involuntary response to a stimulus.

Note: reflex actions are not named on the exam specification so you will not be asked a direct question about them. They are included here simply to help you understand the function of sensory, relay and motor neurons.

STIMULUS	You touch something hot
RECEPTORS	Receptors in the skin detect a stimulus (the change in temperature).
_____ NEURON	
_____ NEURON	
_____ NEURON	
EFFECTOR	The Effector produces a response
RESPONSE	The response is the muscle contracts to move hand away.



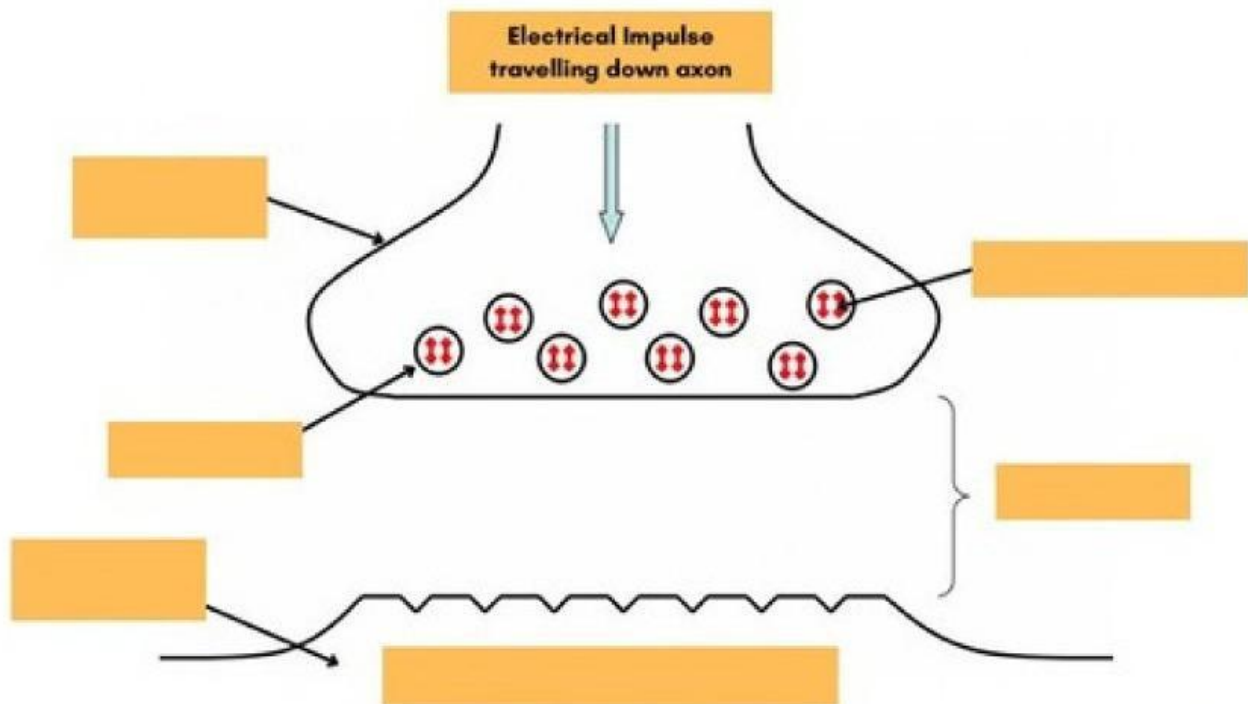
Synaptic Transmission

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BETWEEN neurons, signals are transmitted _____.

Synaptic Transmission is the process by which neighbouring neurons communicate with each other by sending chemical messages across the gap (the synapse) that separates them.

Synapses allow electrical messages to travel from one neuron to an adjacent neuron by transmitting signals chemically using neurotransmitters.



	Process of Synaptic Transmission
V	
R	
R	
E	
R	
R	

Excitation & Inhibition

When a neuron is in a resting state the inside of the cell is negatively charged compared to the outside.

When a neuron is activated by a stimulus (neurotransmitter), the inside of the cell becomes positively charged for a split second causing an **action potential** to occur. This creates an electrical impulse that travels down the axon towards the end of the neuron.

Whether the neuron fires and passes on the electrical impulse to the next neuron **DEPENDS** on whether the neurotransmitters that are received at the post-synaptic receptor site have either an excitatory or inhibitory effect on the next neuron.



Excitation is when ...



Inhibition is when...



Summation

So, some neurotransmitters can have an excitatory effect, and some neurotransmitters can have an inhibitory effect. So, what affects whether the neuron will fire and pass on the electrical impulse or not? Summation.



Summation is the process of adding things together; the excitatory & inhibitory influences are summed.

This basically means that the excitatory and inhibitory influences are summed or totalled.

If the total effect on the post synaptic neuron is inhibitory (i.e. negative in total) then the neuron is _____ likely to fire.

If the total effect is excitatory (i.e. positive in total), the neuron will be _____ likely to fire.

